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COOPERATIVE FOREST INSECT DETECTION REPORTS FOR CALIFORNIA, FOR THE CALENDAR YEAR 1959

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Introduction

Detection of forest insect pests is the process of discovering the presence of insects that currently or potentially are destructive to forest resources. The primary aim is to discover an infestation in the early stages of development so that prompt action can be taken if necessary to prevent or suppress it. In California, surveys for this purpose have been in progress for many years. They are cooperative in nature, and are founded upon the principle of utilizing the services of men in the field to help detect insect outbreaks. These surveys are spearheaded by the Pacific Southwest Forest and Range Experiment Station, but are a part of the cooperative pest detection program which since 1951 has been sponsored by the California Forest Pest Control Action Council.

The principal contributors in this program are foresters employed by private, state, and federal agencies. The number of insect detection reports which they have turned in annually has increased over the years: from a total of 76 in 1951, for example, to nearly seven times this number in 1959. Part of this increase has been due to the larger number of individuals cooperating in pest detection each year, but part is also due to a greater awareness and better ability to detect insect problems.

Insect detection reports for 1959 were numerous enough that an analysis of them might be expected to reveal significant trends. What insect problems cropped up, and with what frequency? Where in the State were insect problems most often reported? Which agencies participated in insect detection surveys and how do their efforts compare? Do the records show weaknesses in insect detection that can be strengthened? Answers to these and other questions were sought in a study made of the records for 1959. This report presents the results of this study.

Methods

Most cooperators in pest detection surveys have had some training to help them recognize the common forest insect pests. When insects are found which are not recognized by the cooperator, the detection report, samples of the insect, and usually a sample of the damage are sent to the Station. There an entomologist analyzes the report and identifies the causal organisms when necessary (fig. 1). The cooperator is informed of the entomological importance of the insect, its potentialities for damage, possibilities for control, and control methods available. In many cases, a follow-up examination on the ground by an entomologist is necessary to evaluate the problem.

In analyzing the 1959 records obtained through this procedure, a frequency table for the insect detection reports received was first constructed. The insects were grouped into broad classes according to the type of damage done, and within classes each specific insect was listed by host and number of reports. The number of reports for different geographic areas (California Division of Forestry Districts) was also summarized.

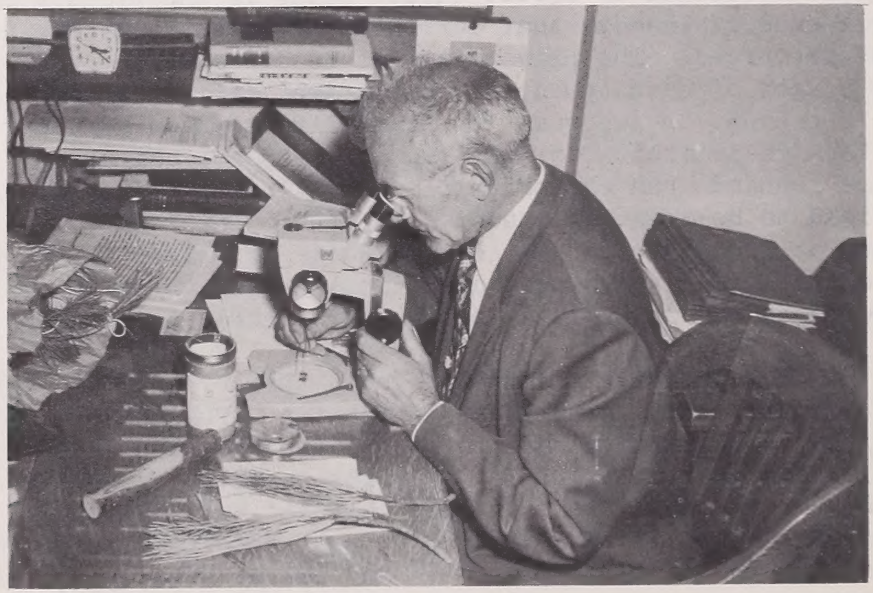

Figure 1.--Samples received with insect detection reports are examined by Station entomologist to identify causal organism.

Detection reports for the national forests were tabulated by forest; those from the California Division of Forestry were tabulated by Districts. A special analysis was made of the records of the past two years covering bark beetles, since these are our most destructive pests.

Results

Altogether 506 detection reports on insects were received for the calendar year 1959, almost double the 289 reports for 1958. By class of agency reporting, the records were distributed as follows:

Agency	Number Reports
Federal	296
State	157
Industry	53
Total	506

Geographically, the largest number of insect reports came from the 12-county area in the east central part of the State, within California Division of Forestry District III (fig. 2)

The origin of these reports, irrespective of the agency which submitted them, is indicated by Districts on the accompanying map (fig. 2). Slightly more than half (272) of all the reports pertained to insect problems on the national forests (table 1). The Sierra National Forest, with

Table 1.--Insect detection reports received principally from the U. S. Forest Service, by national forests

National Forest	Region	Station	Other	Total
Sierra	75	5	2	82
Eldorado	24	0	0	24
Stanislaus	13	7	1	21
Lassen	11	9	0	20
Shasta-Trinity	18	2	0	20
Plumas	15	4	0	19
Tahoe	11	3	0	14
Mendocino	12	1	0	13
Cleveland	10	1	0	11
Klamath	6	4	0	10
Inyo	4	5	0	9
Angeles	8	0	0	8
San Bernardino	5	1	0	6
Sequoia	5	0	0	5
Six Rivers	3	2	0	5
Modoc	2	2	1	5
Los Padres	0	0	0	0
Total	222	46	4	272

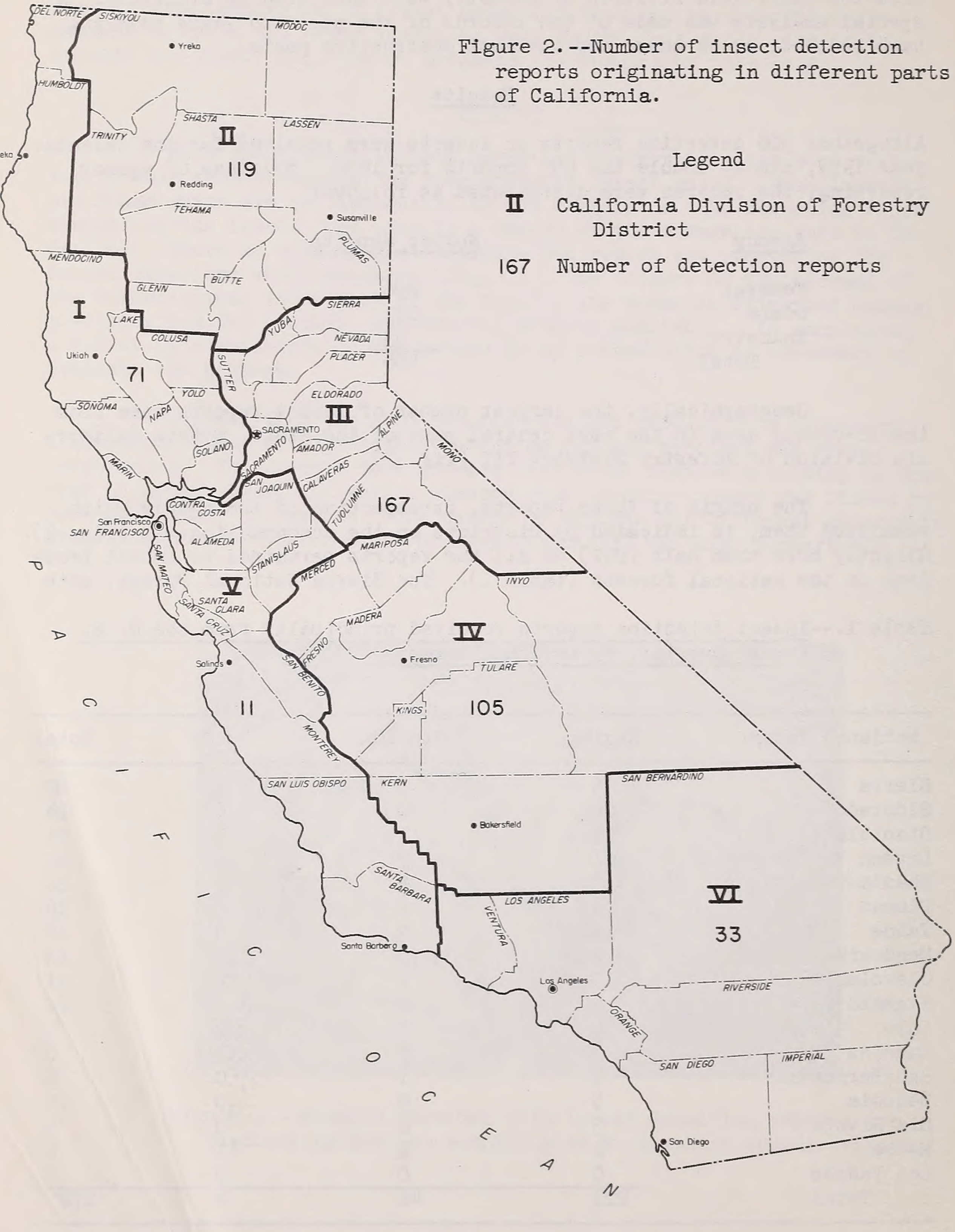

Figure 2.--Number of insect detection reports originating in different parts of California.

82 reports, topped the list; Los Padres National Forest, with none, was at the bottom. Reports from the California Division of Forestry comprised nearly a third (149) of the total, and for this agency District III had the greatest number and District IV the least (table 2).

Table 2.--Insect detection reports received from the California Division of Forestry, by districts

District	Headquarters	Number Reports
I	Santa Rosa	35
II	Redding	26
III	North Sacramento	75
IV	Fresno	3
V	Monterey	5
VI	Riverside	5
Total		149

Bark beetles were the insects that cropped up most frequently, there being 354 detection reports for this group (table 3). Among the other damage groups, the reports were distributed as follows:

Sucking insects	61
Defoliators	47
Twig, terminal, or bud insects	41
Borers	14
Cone and seed insects	11
Miscellaneous	9

Some detection reports covered more than one insect; consequently the sum of the group totals (537) exceeds the number of reports actually received by 31.

The number of detection reports on bark beetles for 1959 was 2.4 times the number for 1958 (table 4). In 1959, bark beetle reports comprised 65.9 percent of the total, compared to 48.4 percent in 1958. The sharpest increase took place during the first part of the year. From January through May, 3.4 times as many bark beetle reports were received in 1959 as in the preceding year. During the remaining 7-month period, the increase was only about half as much (1.6).

Although there was little change in the number of reports on the western pine beetle, reports on the California five-spined ips increased nearly four-fold. And the number for ips in combination with the western pine beetle increased seven-fold. Detection reports for other bark beetles on the average doubled. These changes reflect in part the tremendous rise in damage to ponderosa pine from the activities of ips and the western pine beetle in 1959.

Table 3.--Insect detection reports received in 1959 by class of damage, insect, and host

Insect	Host																				No. Reports
	Coulter pine	Jeffrey pine	Knobcone pine	Lodgepole pine	Monterey pine	Ponderosa pine	Scotch pine	Sugar pine	Douglas-fir	Big-cone Douglas-fir	Red fir	White fir	Incense-cedar	Sitka spruce	Arizona cypress	Redwood	Oak	Cottonwood	Bitterbrush	Ceanothus	
Bark Beetles																					
Dendroctonus brevicomis Lec.	*					*															69
D. monticolae Hopk.				*		*		*													33
D. jeffreyi Hopk.		*																			13
D. pseudotsugae Hopk.									*												4
D. valens Lec.		*				*															3
D. obesus (Mann.)														*							1
D. brevicomis & D. monticolae						*		*													6
Ips confusus (Lec.)	*		*			*		*													71
I. confusus & D. brevicomis	*					*															112
Scolytus unispinosus Lec.									*												30
S. ventralis Lec.											*	*									11
Pseudohylesinus granulatus (Lec.)												*									1
Subtotal																					354
Borers																					
Melanophila californica Van D.		*																			8
Unknown wood borers		*				*					*	*									6
Subtotal																					14
Defoliators																					
Halisidota argentata Pack									*		*	*									16
Coloradia pandora Blake		*																			4
Malacosoma constricta Stretch																	*				3
M. fragile (Stretch)																			*		3
Scythropus californicus Horn.						*															3
Nymphalis californica (Bdv.)																				*	3
Neodiprion spp.		*				*						*									4
Phryganidia californica Pack.																	*				2
Recurvaria milleri Busck				*																	2
Recurvaria sp.		*																			2
Choristoneura fumiferana (Clem.)												*									1
Grasshoppers						*															1
Gelechid moth																			*		2
Unknown defoliators												*									1
Subtotal																					47
Sucking Insects																					
Chermes cooleyi Gill.									*												8
Neomyzaphis abietina (Wlkr.)														*							1
Pineus coloradensis Gill.				*																	1
Unknown aphids											*	*									7
Aspidiotus californicus Colm.								*													14
Matsucoccus paucicicatrices Morrison								*													3
Phenacaspis pinifoliae (Fitch)						*															1
Physokermes (probably picea)														*							1
Unknown scales						*															2
Retinodiplosis inopis (O.S.)		*				*															12
Eurytoma spp.		*																			3
Unknown gall makers																	*				6
Phytoptus pini Nal. (mite)						*															1
Oligonychus milleri (mite)							*														1
Subtotal																					61
Twig, Terminal or Bud Insects																					
Pityophthorus spp.		*				*															9
Phloeosinus spp.															*	*					2
Dioryctria abietella (D.& S.)												*									1
D. zimmermani (Grote)		*				*															3
Dioryctria spp.								*													2
Rhyacionia pasadenana (Kearf.)					*																2
Rhyacionia (probably zozana (Kearf.))						*															2
Petrova spp.	*					*															3
Cylindrocopturus eatoni Buch.		*				*			*												8
C. furnissi Buch.									*												3
Pissodes terminalis Hopp.				*																	2
Oberea quadricallosa Lec.																		*			1
Peridroma (probably margaritosa (Haw.))						*		*													2
Unknown (probably Agrilus)																			*		1
Subtotal																					41
Cone and Seed Insects																					
Conophthorus lambertianae Hopk.								*													3
Trogoderma sternale Jayne					*																1
Barbara colfaxiana (Kearf.)									*												2
Leptoglossus occidentalis Heid									*												1
Megastigmus spermotrophus (Wachtl)									*												2
Megastigmus spp.										*											1
Unknown																			*		1
Subtotal																					11
Miscellaneous																					
Windfall																					2
Snowbreakage																					4
Unknown																					3
Subtotal																					9
TOTAL																					537

Table 4.--Insect detection reports of bark beetles by species, for the 1958 and 1959 seasons

Insect	1958	1959	Ratio 1959 : 1958
Dendroctonus brevicomis	66	69	1.05
D. monticolae	21	33	1.57
D. jeffreyi	4	13	3.25
D. pseudotsugae	3	4	1.33
D. valens	2	3	1.50
D. obesus	1	1	1.00
D. brevicomis and *D. monticolae*	2	6	3.00
Ips confusus	19	71	3.74
I. confusus and *D. brevicomis*	16	112	7.00
Scolytus unispinosus	7	30	4.29
S. ventralis	7	11	1.57
Pseudohylesinus granulatus	0	1	--
Total	148	354	2.39
D. brevicomis and *I. confusus* alone or in combination	101	252	2.50
Other bark beetles	47	102	2.17

Other insects which were reported with greater frequency included the silver-spotted tiger moth, the pandora moth, the black pine-leaf scale, the Cooley spruce gall aphid, and the gouty pitch midge. Large numbers of pandora moths were observed at Laguna Mountain and at the Cuyamaca Rancho State Park. Numerous infestations of the black pine-leaf scale on sugar pine were found in many localities. For all these insects the number of reports received in 1959 was considerably higher than in 1958, and it is believed that this is in part a reflection of population increases that actually occurred this year.

Discussion

In reviewing the source of insect detection reports, considerable differences in the number of reports turned in by the different agencies are apparent. Of the 296 reports from federal agencies, 222 were from Forest Service Region-5, 69 from the Pacific Southwest Forest and Range Experiment Station, and 5 from the Soil Conservation Service, Bureau of Land Management, and National Park Service. Of the 157 State reports, 149 originated with the Division of Forestry and 8 came from the University of California, the Division of Beaches and Parks, and the Bureau of Entomology. The 53 reports from private sources were practically all from private foresters employed by lumber companies.

Every forest worker, whether he is a forester, biologist, tree farmer, or woodsman, is a potential pest detection reporter. Precise information is not available, however, on the number of people who are potential reporters and the number actually reporting. The distribution of reports by agencies may be a fair representation of the potential, although the number from private sources seems low.

Because the detection reports received were not completely uniform, numbers by themselves are not too meaningful. One cooperator may send in a detection report for every group of infested trees seen, while another sends a single detection report for an infestation covering several thousand acres. Reporting by areas, therefore, is variable. This has to be taken into account in evaluating the significance of the reports.

Since the cooperative pest detection program is entirely voluntary, the degree of participation by different individuals is largely governed by their interest and training in forest pest problems. Formal training is one of the most important factors in the success of the program. Both the U. S. Forest Service and the California Division of Forestry have provided training in the recognition and reporting of insect infestations for federal and state cooperators. Some industrial foresters have participated in these sessions, but most have not. The detection program could be materially strengthened by stepping up the training of these cooperators.

Other improvements needed are better quality in the reports, more uniformity as to the type of problems reported, and more prompt reporting. In spite of such weaknesses, it is believed that the insect detection reports for 1959 gave a good picture, in most cases, of conditions that actually prevailed statewide. With the present detection system in effect, it is very doubtful if a serious forest insect outbreak could go undetected for long in the State.